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Assessment of the Impact of Integrated Simulation on Critical Thinking and Clinical Judgment in Nursing Instruction

Rita Allen Meyer

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ASSESSMENT OF THE IMPACT OF INTEGRATED SIMULATION
ON CRITICAL THINKING AND CLINICAL JUDGMENT
IN NURSING INSTRUCTION

by

Rita Allen Meyer
Bachelor of Science, Minot State University, 1991
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A Dissertation

Submitted to the Graduate Faculty

of the

University of North Dakota

In partial fulfillment of the requirements

For the degree of

Doctor of Philosophy

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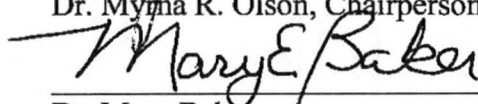
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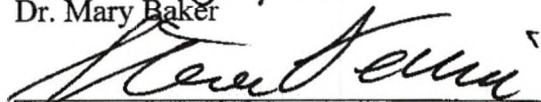
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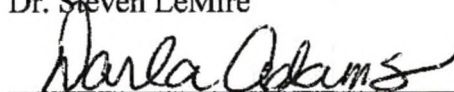
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This dissertation is being submitted by the appointed advisory committee as having met all of the requirements of the Graduate School at the University of North Dakota and is hereby approved.



Dr. Wayne Swisher

Dean of the Graduate School



Date

PERMISSION

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Rita Allen Meyer
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ABSTRACT

The purpose of this study was to explore the effects of using simulation and didactic instruction on critical thinking and clinical judgment with student nurses enrolled in a fall semester medical-surgical class. Specifically, it was of interest to compare the performance of these fall semester nursing students with the performance of nursing students enrolled in a spring semester class who received only didactic instruction.

The study consisted of 18 participants who were nursing students enrolled in the senior level Adult Medical-Surgical III, the third medical-surgical class in the curriculum. There were two non-randomized groups. The experimental group received the intervention, which was a combination of three-hour lecture classes paired with one-hour simulation activity planned around the lecture topic. The integrated method went on throughout the semester. The control group had three hours of lecture alone. Both groups took the California Critical Thinking Skills pretest and posttest.

Clinical judgment was also evaluated. All nursing students in groups of three led a simulation scenario. The four scenarios consisted of material covered throughout the semester: Myocardial Infarction, Respiratory Distress, Trauma, and Diabetic Ketoacidosis. The nursing students selected their scenario blindly and were to take the charge nurse position in the care of the patient. The scenarios were performed in the simulation lab with "Sim Man," a high-fidelity human simulator. The scenarios were videotaped using a three-view video feed, which allows for multiple views. The nursing

students were evaluated using a modified Lasater rubric that had been individualized to each scenario. The results of the study indicated no statistically significant changes between either group.

Recommendations for nurse educators include utilizing opportunities in the classroom, simulation lab, or in the clinical area for nursing students to practice complex decision making in a safe, simulated setting using the nursing process. Additionally, nursing students should be encouraged to take advantage of internships.

Keywords: Simulation, Critical Thinking, Clinical Judgment, Nursing Process

CHAPTER I

INTRODUCTION

The need for healthcare generally begins at birth and continues throughout life. Nurses have been major contributors to healthcare since the early part of the 20th century. Since that time, the manner in which healthcare is provided by nurses has evolved, and, with this evolution, so also has the challenges and responsibilities (Stanton & Rutherford, 2004).

Healthcare costs in 2010 soared to 17.4% of the Gross National Product (GNP), the largest jump since records have been kept. Increases in healthcare needs have been attributed to an increasing demographic of aging Americans, and a rising percentage of poorer Americans. Healthcare and its related issues now encompass major constituents of political agendas and occupy a large segment of campaign platforms. The dynamics of political influence, technology, patient diversity, and new treatment modalities have greatly impacted healthcare providers, in particular nurses. The implications brought on by these changes have influenced the supply and demand for nurses, and the necessary education required in preparing them (American Association of Colleges of Nursing, 2012).

The task of providing care to the sick in hospitals and nursing homes has now expanded far beyond those boundaries. The educational establishments and their accrediting bodies are challenged to keep pace and produce nurses who can accommodate the changes in technology and medical treatments but retain the art of nursing and the

compassionate care-giving that the nursing profession represents (Hillenbrand, 2004). Nurse educators are faced with shortages of nurses and nursing faculty, diminishing economic resources for education and research, limited clinical sites, and a need to develop teaching strategies that can facilitate higher levels of clinical reasoning and critical thinking. The ability to deliver these educational outcomes will require a curriculum that utilizes more diverse and innovative teaching strategies (Diekelmann & Lampe, 2004; Ironside, 2003; National League for Nursing, 2002, 2008b; Young, 2004).

Background

The profession of nursing, once considered a vocational career choice, has evolved into a profession that melds the fundamentals of science, nutrition, psychology, math, technology, human behaviors and nursing, and applies those concepts into the care delivered to patients (Encyclopedia Britannica, 2012).

In 1999, the Institute of Medicine (2001) reported the following statistics: At least 44,000 people, and perhaps as many as 98,000 people, die in hospitals each year as a result of medical errors that might have been prevented. This landmark report represents the beginning of questioned accountability for all healthcare providers and since that time healthcare institutions have modified policies, and some steps toward patient safety have been implemented. Nonetheless, a report that came out 10 years after *To Err is Human – To Delay is Deadly* (2009) revealed there continues to be a lack of public reporting of hospital acquired infection that is speculated to kill 100,000 people annually. Few hospitals have adapted well-known systems to prevent medication errors and as of this time no standardized method for tracking patient safety improvements that have been implemented. Nurses are taught to provide holistic care and to assume the responsibility

for evaluating all care rendered to the patient throughout their shifts. Unlike healthcare providers who are responsible to provide a certain aspect of care, deliver an intervention, and then leave, nurses must attend to the ongoing care that is needed. Furthermore, nurses must be knowledgeable about the effects of other collaborative interventions, vigilant in the changes that may result, and be able to communicate, as needed, any changes that do require further intervention. In addition, the educational requirement, to prepare nursing generalists, is one that has become a specialty itself. A prepared nurse must maintain knowledge of all body systems: know the difference between a dosage suitable for an adult and the dosage that should be used for the pediatric patient. Furthermore, the prepared nurse must endorse the reality that lifelong learning is not an option (Bednash, 2008).

The challenge for today's nurse educator is to prepare nursing students who are well versed in multidimensional care, medical therapy, rapidly changing technology, clarity in relevant information, knowledge of expected therapeutic and potentially undesirable responses of all delivered healthcare interventions, and are able to develop a relevant plan of action based on factual judgment (Alfaro-LeFevre, 1995; Fowler, 1998). In addition, the nurse must possess the knowledge needed to recognize the unexpected complexities that may occur with existing co-morbidities and aging factors that can exacerbate many conditions. Nurses must consider all physical and psychosocial needs for patients under their care and consider the significance of any changes in assessment that by failing to act accordingly can result in poor healthcare outcomes (Snyder, 1993).

Students who have attended an accredited institution, and successfully passed the National Council Licensure Examination (NCLEX), move forward to employment and

expect that a complete orientation for the position will be given. This period is important in a number of ways: It familiarizes the graduate with the responsibilities of the nursing position; introduces the unit's policies, procedures, and routines; and, most importantly, assists in the transition from the role of student nurse to registered nurse. This period of time establishes first impressions and lays the foundation for the career trajectory. In today's healthcare institutions, the luxury of an extensive orientation often does not occur (Dyess & Sherman, 2009). Many factors impede the orientation process: costs, inadequate nursing staff, and the unwillingness of overextended nurses to mentor new nurses, which leaves new graduates less prepared to be autonomous in their new role. According to Goulette (2010), all new nursing graduates must be precepted before they can work independently. Nursing shortages or staff reductions imposed by the present economy result in inadequacies in the nursing department and the lack of working nurses cannot accommodate the needs of new graduates.

The dynamic healthcare venue of the 21st century has created challenges for all facets of healthcare as well as healthcare providers. Educators who prepare future nurses must adapt to the changing healthcare delivery systems, abbreviated hospital stays, new technologies, changing informatics (computerized charting), changing pharmacological therapies, increases in nurse workloads, the proliferation of community acquired infections, the rise in antibiotic resistant infections, increase in the aged population, and the growing number of chronic and co-morbid conditions (Aiken, Clarke, Cheung, Sloane, & Silber, 2003). Nurse educators are responsible to prepare generalists who can meet the rigors of healthcare changes, and the expectations of employers who require graduates to function at the level of seasoned nurses at the time of graduation. In 2008,

the National League for Nursing (NLN), an organization consisting of nurse educators and professional leaders, was summoned to conduct a “think tank on transforming clinical education” to reconcile the present differences between academia and the clinical practice gap that exists in today’s healthcare (National League for Nursing, 2008b). After much brainstorming and discussion, the teaching strategy of simulation was proposed as a method that could ease the gap from nursing school to clinical practice. In the following section, simulation is described in terms of its use in the field of nursing.

Simulation

Simulation is an attempt “to replicate some or nearly all of the essential aspects of a clinical situation so that the situation can be more readily understood and managed when it occurs for real in clinical practice” (Jeffries, 2007, p. 3). The first mechanical model appeared in healthcare in the 1960s with “Resusci Anne,” a full-sized mannequin used for training in cardiopulmonary resuscitation (Jeffries, 2007). In the 1980s, a modest increase in simulation use took place in anesthesia, aviation, and military training. The technology boom of the 1990s took simulation to a new level and its use grew exponentially, a spin-off of the Virtual Human Project and genesis of the World Wide Web (Sliwka, 2008). The last 10 years have witnessed an upward trend in the use of simulation in medicine and nursing education.

Simulation is described in terms of fidelity, which reflects the degree of precision needed for the object replicated, and is categorized as low, moderate, and high (Childs & Sepples, 2006). Low-fidelity simulators, often referred to as task trainers, are practical for teaching skills and procedures and have been used in nursing education since the 1950s with the advent of Mrs. Chase, a life-sized doll. Simulators used as task trainer models do

not feel like real body parts, but offer the student an opportunity to practice steps in a procedure with an object reflecting an anatomical likeness prior to performing the procedure on a real patient (Nehring & Lashley, 2010). Moderate-fidelity simulators have a pulse, blood pressure, and the capacity to breathe, but do not look or feel like a real person. Vital-Sim, by Laeredal, is an example of a moderate-fidelity simulator and can be used for skills acquisition, rhythm recognition, health assessment, critical thinking scenarios, and crisis situations. High-fidelity simulators have life-like qualities: the capacity to cough, talk, blink, and some even have the capacity to respond physiologically to medical and pharmacological intervention. Mr. Sim Man and Medi Man are examples of high-fidelity simulators. With this type of simulation, real ECG rhythms and lung, cardiac, and bowel sounds can all be realistically auscultated, and the simulator can be programmed to talk. Simulated healthcare crisis scenarios challenge the student to think critically, prioritize interventions, and actively use the nursing process to guide reasoning and clinical judgment in a safe environment (Jeffries, 2005; Nehring & Lashley, 2010).

According to Jeffries (2007), a simulation model adapted for advanced applications is complex, multifaceted, and challenging to the student. The design should consider each of the following: teacher, student, educational practices, design characteristics, outcomes, and a physical environment reflective of a real clinical picture. The simulated health crisis scenario requires students to actively engage in a problem-solving approach; by applying and integrating conceptual knowledge, they are more able to prioritize the nursing interventions needed and develop an appropriate plan of care. Simulation used to augment theory allows theoretical concepts discussed in the

classroom to be repeated in the simulation lab and allows the learner to visualize the concept in a mannequin programmed to display symptoms of the disease. This opportunity provides student engagement, demonstration of the nursing process, and guidance in critical thinking and clinical reasoning. The environment should reflect a “clinical setting” prepared to reflect an actual hospital situation with corresponding equipment, medications, and instruments needed for students to immerse themselves as nurses who utilize psychomotor skills, perform assessments, and make mistakes in a safe and non-threatening environment without causing injury.

Furthermore, this form of pedagogy allows the nurse educator to design the simulation model from general to specific or with cases of high frequency to low frequency. This aspect could also guide clinical reasoning and critical thinking gradually increasing the number of dimensions of the illness. Although simulation can provide an excellent educational method, consideration must be given to other facets: fiscal constraints, physical space, additional staffing, technological capabilities, faculty training, and additional time to set up the scenario and tear it down. Simulation is a teaching modality that can be further developed to better transition graduating students into employment, and better prepare graduates for the dynamic nature of healthcare.

While healthcare will continue to be dynamic and change will be constant, nurses who can adapt to the complexity of illness and treatment, patient diversity, limited resources, and exploding technology are those who will provide the highest level of safe care, creatively solve problems, and be efficient in the critical thinking process at the time of graduation (Benner, Sutphen, Leonard, & Day, 2009).

Critical Thinking

Throughout the history of education, there have been numerous thoughts about what constitutes critical thinking. In attempting to define critical thinking, one finds there is not a universal definition among disciplines; within the discipline of nursing, incongruence exists. Nonetheless, critical thinking has been recognized and emphasized as an essential skill in the preparation of baccalaureate nurses, as well as a requirement for accreditation (National League for Nursing, 2008a). Lack of a universal definition in nursing prompted a group of nurse educators to approach the National League for Nursing (NLN) and to bring to their attention the lack of a standardized definition for critical thinking, questioning whether the incongruence influenced the manner in which nursing care is delivered (Facione & Facione, 2008). In response, the NLN held a conference in 2000, bringing together the foremost experts in critical thinking from numerous disciplines to form a “think tank.” The purpose of the conference was to establish a uniform definition of critical thinking and identify the behaviors that operationalize the definition specifically for the nursing profession. Since that time, the governing and regulatory bodies in nursing have identified that critical thinking is an inherent factor in the ability to clinically reason and formulate clinical judgments and decisions that affect patient outcomes. The American Philosophical Association (APA) gathered a panel of experts from several disciplines to form the Delphi Project for this purpose and succeeded in that endeavor. The NLN “think tank” used their definition as a guide and developed the following definition of critical thinking specifically for nursing: “Critical thinking in nursing practice is a discipline specific, reflective reasoning process that guides a nurse in generating, implementing, and evaluating approaches for dealing

with client care and professional concerns” (National League for Nursing, 2008a, p. 2). This definition is applied and demonstrated in the ability of the nurse to perform the nursing process. Critical thinkers in nursing exhibit the following habits of the mind: confidence, contextual perspective, creativity, flexibility, inquisitiveness, intellectual integrity, intuition, open-mindedness, perseverance and reflection (Scheffer & Rubenfeld, 2000, p. 357). The National League for Nursing Accreditation Commission (2002) sees critical thinking as “the deliberate nonlinear process of collecting, interpreting, analyzing, and drawing conclusions about the presenting factors and evaluates the information that is both factually and belief based” (p. 8). This process is clearly demonstrated in nursing care when using clinical judgment. Alfaro-LeFevre (2009) asserts that critical thinking, clinical judgment, and clinical reasoning are often used interchangeably, but emphasizes that critical thinking and clinical reasoning are the processes used to arrive at a clinical judgment.

Clinical Judgment

Clinical judgment reflects the outcome of the nursing process. Critical reasoning and critical thinking are essential in guiding the nurse to process the relevance of information, apply content knowledge, analyze labs, and determine what the plan of care should be. Many teaching strategies have been tested to enhance the student’s ability to perform competently, but the majority of new graduates tested have not performed at entry level proficiency (Del Bueno, 2005). Educators speculate that the focus of education for many students is mastery of content knowledge, and they have not been challenged frequently enough to be fluent in application of that knowledge to clinical

situations (Del Bueno, 2005; Fero, Witsberger, Wesmiller, Zullo, & Hoffman, 2009; Walsh & Seldomridge, 2006).

The 21st century has ushered in a very complex healthcare system. In addition, the complexity of diagnostic tests, medications, and other treatments used in managing patients' care demands that continuous decisions need to be made. The nurse must be able to formulate clinical judgments when providing care for patients that ensure the most positive outcomes possible. The challenge to nurse educators is to creatively add the application component to lecture and assignments with emphasis in the clinical area so that the nurses they prepare can meet these challenges.

Statement of Purpose

The purpose of this study was to explore the effects of using simulation and didactic instruction on critical thinking and clinical judgment with nurses enrolled in a fall semester medical-surgical class. Specifically, it was of interest to compare the performance of these fall semester nursing students with the performance of students enrolled in a spring semester class who received only didactic instruction.

Research Questions

1. Did the incorporation of simulation with didactic instruction in a fall semester medical-surgical class result in significantly higher scores on the California Critical Thinking Skills Test when compared to the ratings of student nurses receiving only didactic instruction in the spring semester?
2. Did the incorporation of simulation with didactic instruction in a fall semester medical-surgical class result in significantly higher ratings of clinical judgment

when compared to the ratings of student nurses receiving only didactic instruction in the spring semester?

Theoretical Framework

Cognitive Constructivism Ideology by Gabler and Schroeder (2003) was chosen to guide this study. Constructivism involves a shift toward student centered learning and provides students ownership of their learning. The teacher provides the environment that invites the learner to ask questions, examine problems, and determine consequences of any actions taken. This approach was endorsed by Dewey, Brunner, and later Vygotsky. Each contributed to this method of teaching/learning albeit in different capacities.

Cognitive Constructivism was helpful in guiding the teaching plan used in this study to integrate didactic instruction with simulation. Vygotsky places a great emphasis on the construction of knowledge. The student is the active component building repertoire of knowledge on bits of information from previous experiences. As new information is added, it is integrated with stored information and helps the student make sense of it. Each person is unique in this manner and each person's repertoire will differ; however, in a collaborative experience, clarity can be gained through the meanings they make of the experience or questions other students may ask. Each student who actively engages in the class restructures information previously known and adds additional meaning or understanding, which allows the formation of new inferences and resolves conflicting information. Simulation (along with lecture content) allows repeated reflection on the lecture content; immerses the student in a quasi-clinical setting; familiarizes students with equipment, medications, and other instruments that may be needed if this situation were real (Gabler & Schroeder, 2003).

CHAPTER II

LITERATURE REVIEW

The purpose of this study was to explore the effects of simulation and didactic instruction on critical thinking and clinical judgment with student nurses enrolled in a fall semester medical-surgical class. Specifically, it was of interest to compare the performance of these fall semester nursing students with the performance of the nursing students enrolled in a spring semester class who received only didactic instruction. Recent findings about nursing students, such as the high number of new graduates who leave the profession after a brief period of time, the lack of critical thinking and clinical judgment among new graduates, and the gaps between what students know and what they are able to actually apply in the clinical arena, make it clear that change is needed in the methodologies that are used to educate them (Del Bueno, 2005).

This chapter is presented in three primary sections. First, the history of nursing education is described through the present time. Next, some of the current complexities in healthcare that have had a particular impact on nursing education are discussed. Finally, teaching methodologies (including simulation) utilized by nurse educators to promote critical thinking and clinical judgment are reviewed.

History of Nursing Education

Dating back to Florence Nightingale, one can trace the beginning of professional nursing. The fearless manner in which she approached patient care, the disease process,

and the environment that housed the sick laid the foundation for the evidence-based practice used in nursing today (Egenes, 2004; Woodham-Smith, 1951). Florence Nightingale founded the School of Nursing at St. Thomas Hospital in London for the education of professional nurses. The school was the result of a trust fund given to Florence Nightingale in appreciation for her work in the Crimean War. The difference between this school and others that preceded it was the addition of theory and training in different specialties within the hospital. This could be done because this school was not a hospital-based school; rather, it was a school with a curriculum based on student needs (Baly, 1997; Seymer, 1960). The influences of war created the need for nurses, but the 3,000 women who served in the Civil War had only the training that came from their personal and wartime experiences (Livermore, 1988).

After the Civil War, cities in the United States flourished and the need for work proliferated; however, more people meant crowded living conditions. This crowded environment served as a conduit for the spread of disease. To accommodate this population, municipal almshouses were established, which eventually evolved into public hospitals. Nightingale's success in the Crimean War fueled social and financial support that further resulted in requests for Nightingale's graduates to begin other nursing schools. The first schools in the United States were modeled after Nightingale's, which had a standard curriculum and used paid instructors. Early schools lacked the support of physicians, who questioned the rationale for nurses to have any more education than basic training (Goodnow, 1953). Great strides and advances in medicine and the scientific knowledge of diseases came as a result of the introduction of the microscope, leading to the development of more nursing schools and professional organizations. The American

Nurses Association (ANA) evolved from the “Nurses Associated Alumnae,” who worked to standardize the curricula of nursing schools, licensure of nurses, screening of nursing school applicants, and the establishment of a code of ethics. At this time, nurse training schools were apprenticeships that could last from a few months to three years, and there was a range of entrance requirements and education curricula. The Society of Superintendents of Training Schools of Nursing was formed in 1893; this organization is now the National League of Nurses (NLN). Their goal was to improve the standards of nursing education and provide consistency to the curricula. Licensure of nurses began in 1901 with the enactment of the Nurse Practice Act and, by 1921, 48 states had ratified this practice. Early laws improved the status of nurses, but the lax, permissive nature of the laws and lack of enforcement led to disregard for the title of registered nurse and limitations on who could use it (Schorr & Kennedy, 1999).

The Great Depression brought about the use of self-employed workers as private duty nurses, a reduction in hospital beds, and financial ruin for many. During this time, hospitals used their training schools for patient bedside care, and those hospitals that lacked training schools staffed their hospitals with uneducated people. Unemployed nurses were eventually able to negotiate their training without salary in exchange for rooms, meals, and laundry (Kalisch & Kalisch, 1995). The enactment of the Federal Emergency Relief Administration provided funds for bedside nursing care in the homes of those receiving unemployment benefits, graduate nurses who provided instruction to home workers, health education programs, student instruction in hygiene, preventive measures, and care of infants and children. World War II required the need for many

nurses; however, initially the nurses who joined the military were shunned and barely tolerated.

As the war progressed, acceptance of the care that nurses provided for wounded soldiers did come from doctors, and a total of 1,500 nurses entered the army during the Civil War. World War II required even more nurses in the military branches; by the end of World War II, a total of 77,000 nurses served in the armed forces. During times of war, nurses gained respect and public support, which, in turn, improved the supply of nurses and the quality of education (Kalisch & Kalisch, 1981).

After the war, there was a major shortage of nurses: Many who had been nurses during the war married and stayed home to raise families. Nursing wages at that time were far less than that of elementary teachers, and the autonomy that nurses experienced in times of war was now reduced to subservient roles. In 1946, the American Nurses Association (ANA) approved state nurses' associations to be collective bargainers for their nurses; nonetheless, because they added a "no strike clause," it was ineffective. Consequently, nurses took on their own negotiations and collectively with their increased numbers could put enough pressure on employers to increase economic security (Stafford, Taylor, Zimmerman, Henrick, Perry, & Lambke, 2000).

At this time, training through apprenticeships was still the most frequently used practice and was criticized for a lack of rigor by academicians. Following World War II, there was a significant increase in the number of students who sought college degrees, but the number of baccalaureate programs grew at a slow rate in the 1950s and 1960s. The majority of education continued through hospital-based diploma programs that depended on hospitals for financial support; in turn, the priorities of the schools were

relegated to hospitals (Donley & Flaherty, 2008). The shortage of nurses following the war created a need for a large supply of nurses that were needed in a short amount of time. At this time, the associate degree (ADN) in nursing came about. The intent of the program was to train nurses who would practice exclusively at the bedside over a two-year period of time under supervision. The success of the associate program was tested after five years, and it was found to be efficient in the training of nursing skills (Haase, 1990). As the number of community colleges grew, so did the number of ADN programs, which led to a reciprocal reduction in the number of nursing diplomas. ADN programs have since evolved into a stepping stone to obtain a baccalaureate degree. Nurses in the 1960s enjoyed progress toward better salaries and benefits packages; in addition, improved working conditions emerged through collective bargaining and negotiated contracts. In the late 1970s, there was a rise in the number of master's degree programs, clinical specialists, nurse practitioners, researchers, and nurse administrators. In the 1980s, 22% of RNs held bachelor's degrees, 18% had associate degrees, and 63.2% began with a diploma degree. The number of baccalaureate degree nurses in 2004 increased to 34%, and an additional 33% of the registered nurses acquired associate degrees.

At this juncture, the American Association of Colleges of Nursing (AACN) and the American Nurses Association (ANA) recognized the BSN degree as the minimal educational standard for a professional nurse, but there have been no mandates to enforce this practice, and the one state, North Dakota, that did implement this mandate has since rescinded it (Bender, n.d.). Research supports that better patient outcomes are achieved when institutions are staffed with greater numbers of baccalaureate-prepared nurses

versus associate degree nurses (Aiken et al., 2003). Nonetheless, no change has occurred and gaps have been reported in educational preparation and in the development of faculty across all types of nursing schools (Carnegie Foundation for the Advancement of Teaching, 2009).

Twenty-First Century Healthcare Complexities

The 21st century has arrived, bringing great challenges for healthcare. Nurses are the largest aggregate in healthcare that provide patients with bedside care, monitoring, and assistance in teaching the elderly how to manage their care at home (Benner et al., 2009).

Some of the most daunting changes experienced by nurses are the level of acuity and complexity with brief hospital stays seen in admitted patients today. As people live longer, their admission diagnosis is only a part of the care that will be involved. As people age, so do their organs, bones, and tissues, and the capacity for adaptation to the physiological stress that aging brings makes chronic illness and disease more limiting. In addition, the treatments that are provided often create the need for additional monitoring, medication administration, and rounds for the nurse taking care of the patient. In acute-care facilities, the ratios of the numbers of patients to nurses have also increased, allowing less time for nurses to spend with each patient. This has impacted patient safety and the ability of nurses to detect changing conditions in their patients (Benner et al., 2009).

The implementation of electronic records (documentation, acquisition of records, lab values, diagnostic reports, and physician orders) has required nurses to learn new and

complicated systems. This learning has resulted in greater time expenditure away from direct patient care.

The economic recession along with nurse shortages has greatly minimized the amount of time that can be used to precept new nurses or supervise student nurses, and, to complicate matters further, the abbreviated hospital stays have reduced the numbers of clinical sites available. There continue to be numerous entry levels for nurses and nursing shortages in some areas of the country. Despite the effort of nursing schools to increase their enrollment numbers, the increases have been minimal. This contingency is, in part, a result of the shortage in nurse educators. According to the American Association of Colleges of Nursing (2009), 39,423 qualified applicants were turned away from 550 entry baccalaureate nursing programs. This dilemma can be attributed to a 60.7% shortage in faculty and insufficient clinical placement sites.

Changes in healthcare will continue, and the amount of information related to disease, medicine, diagnostics, and pharmacology will continue to grow as well. As nurses are the coordinators of patient healthcare and must have a working knowledge of all components of healthcare, how they are educated is of major importance. None of the above noted complexities will be resolved quickly, and the strategies that are likely to be successful are those that will involve systems, innovation, and vision to deal with them. It becomes imperative that students who graduate from nursing schools have the tools to adapt to the chaotic hospital or clinical environment, competence in the skills needed to manage complex health conditions, and the ability to critically think through situations that they may have never seen before to facilitate the best outcomes possible.

The Carnegie Foundation for the Advancement of Teaching (2010) identified numerous barriers for nurses:

The chaotic U.S. health care system and the economic forces that drive it, shortage in the ranks of nurses, shortage of nursing educators, multiple pathways to the profession that discourage rather than encourage practicing nurses to complete post licensure degrees threaten to compromise nurses' ability to practice state-of-the-art nursing and enact the profession's core values of care and responsibility. (para. 2)

Recommendations are as follows:

- that the baccalaureate degree in nursing should be the minimal educational level for entry into practice and that within ten years after graduation that all nurses complete a master's degree in nursing.
- that nursing program capacities have to be expanded so that students can complete nursing programs in a reasonable amount of time and that the associate of nursing degree from community colleges be re-evaluated in light of the extended amount of time most student nurses spend in completing these nursing programs.
- that coursework be tied to what actually happens in patient care rather than in the abstract, helping students make the connection between acquiring and using knowledge, integrating the classroom with clinical practice
- that nurses are prepared for the myriad contexts in which they will work, not merely a hospital setting. (Carnegie Foundation for the Advancement of Teaching, 2010, para. 3)

The pedagogies used in the past are no longer sufficient for the students in our contemporary medical environment. The Carnegie National Nursing Education Study examined three dimensions of nursing education: theory and learning of scientific methods, mastery of a skillful practice, and the formation of a professional identity. Their findings reflect the following: Today's nurses are undereducated for the demands of practice, a practice gap exists between what is learned and the ability to practice in clinical settings, nursing programs in the United States are effective in establishing professional identities and ethical components; however, they demonstrate a lack of teaching effectiveness in nursing science, natural science, social science, and technology (Carnegie Foundation for the Advancement of Teaching, 2009). Domino (2005) noted that even though nurses represent the greatest number of healthcare providers, they are also the least educated. Many healthcare professions require a minimum of a baccalaureate degree, and others, such as physical therapy, speech therapy, and occupational therapy, have even moved to a master's or doctoral degree for entry into practice. The demand for nurses, however, is growing faster than enrollment in schools of nursing. Replacing the large number of RNs who will soon retire will require a rapid expansion in output from both two-year programs and baccalaureate programs; yet, nurse education programs have been forced to turn away thousands of qualified applicants in recent years (Buerhaus, Auerbach, & Staiger, 2009).

Teaching Methodologies That Foster Critical Thinking/Clinical Judgment

Nurse educators must prepare nurses who possess expanded knowledge in the sciences, social sciences, chemistry, math, pharmacology, and pathophysiology.

Furthermore, nurses require a mastery of psychomotor skills and competencies in nursing science. The expertise comes only when higher-level thinking occurs and the knowledge can be applied and integrated in the clinical area. The outcomes of baccalaureate programs offer more advanced education in areas that support critical thinking, clinical reasoning, and analytical skills; they prepare nurses for a broader scope of practice; they further professional development; and they facilitate an understanding of complex issues affecting the state of healthcare. In a recent hospital-based study of graduates, researchers found that new graduates believed that they had the knowledge to perform the essential skills. However, the preceptors and management felt that even though the graduates had knowledge of the essentials, they were lacking in specific skill sets, including intravenous insertion, documentation of patient information, and the use of electronic charting (Yurdin, 2007). Research that focused on the perceptions of the employer as well as the perceptions of the new graduate found that the employers believed that nursing graduates must be prepared as generalists. Collaboration between schools of nursing and employers must occur; partnerships need to be created between the faculty and hospital nurse directors to prepare specialists, enable collaborative research, arrange for residency-type orientation experiences for new graduates, and employ strategies to foster critical thinking and clinical judgment (Jamney, 2007).

Definition of Critical Thinking

Critical thinking is utilized multiple times throughout a typical day for a registered nurse. Nurse educators are challenged and required to assure that these critical thinking skills are developed in students before they graduate. The construct of critical thinking goes back 2,500 years to Socrates, who realized that, when challenged, people

cannot justify their knowledge through reasoning or evidence. He found that most people in authority were not dependable in knowledge or insight. Through the use of probing questions, he challenged the truthfulness of any claim and found that most expert knowledge could not be verified with any consistency (Paul, Elder, & Bartell, 1997). Many philosophers followed Socrates, but none of them developed a definition that all could agree upon. Dewey (1916) described critical thinking as suspended judgment in an attempt to determine the problem before attempting to solve it. He believed that if you could restructure the problem, you could incorporate a solution. He advocated for an educational system where students learn by doing, and by engaging the students in active forms of learning, improvement in intellectual growth would be possible. He also believed that if students reflected on their actions and the consequences, they would better learn and retain what had occurred in the process (Dewey, 1989).

Critical thinking is a process much like thinking. In thinking, traits can be identified, such as “remembering, repeating, reasoning, reorganizing, relating and reflecting” (Costa, 1985, p. 141). When considering critical thinking, we look at a process that requires examination, reasoning, evidence, and logic so that when applied to a situation, it can help one to formulate a response.

In 1991, the National League for Nursing (NLN) mandated that nursing programs include critical thinking content throughout the nursing curricula, that it be a component of program outcomes, and that it be one of the essential skills of baccalaureate education (National League for Nursing, 2008c). Critical thinking can be integrated into the curricula as part of the nursing process (American Association of Colleges of Nursing, 1998). The concept of critical thinking in nursing and how it can be better integrated into

education and clinical experiences has been written about in numerous journal articles and books by nurse educators (Alfaro-LeFevre, 1995; Bradshaw & Lowenstein, 2011; Haskvitz & Koop, 2004; Henneman & Cunningham, 2005; Miller & Babcock, 1996; Paparella, Mariani, Layton, & Carpenter, 2004; Pesut & Herman, 1999; Rubenfeld & Scheffer, 1995). However, Del Bueno (2005) found that only 35% of new graduate nurses are capable of using critical thinking adequately.

In the Delphi study conducted by the American Philosophical Association (APA) in 1990, critical thinking was described as a reflective process of purposeful, self-regulatory judgment. The consensus definition of critical thinking by Scheffer and Rubenfeld (2000) is as follows:

Critical thinking in nursing is an essential component of professional accountability and quality nursing care. Critical thinkers in nursing exhibit these habits of the mind: confidence, contextual perspective, creativity, flexibility, inquisitiveness, intellectual integrity, intuition, open-mindedness, perseverance, and reflection. Critical thinkers in nursing practice the cognitive skills of analyzing, applying standards, discriminating, information seeking, logical reasoning, predicting, and transforming knowledge. (p. 357)

In addition to identifying the cognitive skills, Lasater (2007a) also identified the importance of the context in a situation and the repertoire of previous experiences of the nurse. The consideration of this factor, and what the nurse brings to the situation, was also supported in the Lasater Clinical Judgment Rubric (Lasater, 2007b).

Boostrom (1994) defined critical thinking as a way of looking at the reasons for believing one thing rather than another and paying attention to the details. Thiele, Higgs,

and Busch (1993) described the elements of clinical decision making. For some, critical thinking is a process underlying effective clinical problem solving and decision making (Oermann & Gaberson, 1998; Oermann, Truesdell, & Ziolkowski, 2000). Alfaro-LeFevre (1995) defined critical thinking as purposeful, goal-directed thinking that uses the scientific method directed towards making judgments. This definition is appropriate for the nursing process, as it describes a problem-solving method inherent to nursing that includes assessing the situation, identifying the problem, developing a plan, implementing interventions, and evaluating how the interventions worked. Many educators use critical thinking interchangeably with clinical judgment, clinical reasoning, and clinical decision making, and although much has been said about critical thinking, the research is not conclusive. Alfaro-LeFevre (1995) and Walsh and Seldomridge (2006) describe clinical judgment and decision making as the end product of critical thinking and the outcome of the process.

In the past, many different strategies have been used to improve critical thinking. One strategy that has been used with consistency is the clinical component of the nursing class. This part of nursing education introduces the students to the application of nursing science in the area of nursing that they are studying. The clinical aspect provides the opportunity to gain proficiency in nursing skills beginning with a foundation of several skills. As the students' progress through the program, they continue to add additional skills with increasing complexity. The skills they learn to perform are usually practiced and evaluated under the supervision of the instructor in the learning lab before being performed on a patient. As the student grows in knowledge and continues to progress through the nursing program, the skill requirements, number of skills, and the complexity

of the patient increases as well. Critical reasoning and critical thinking are pieces of the process that guide the clinical judgment that nurses use in the clinical decisions they make (Hoffman, 2008; Vacek, 2009). Preparation to care for the assigned patient generally requires the student to know the reason for admission, the pathophysiology of the disease, the medical treatments used in the plan of care, and any lab values. A pre-clinical conference with the student opens up a dialogue between the student and the clinical supervisor and allows for open questioning about the assigned patient and specific information relating to the assigned patient (medications, catheters, IV fluids, diagnostic tests, nursing interventions). The student responds or has the opportunity to ask questions and have the concepts clarified. Post-clinical conferencing time is spent in discussion about the patient and the patient's progress throughout the clinical time spent. This type of critique and self-reflection has been identified as an aid in the development of critical thinking (Walsh & Seldomridge, 2006; Williams, 2001).

Care plans are utilized to demonstrate the nursing process and provide evidence that the student is knowledgeable about the patient and the process. Concept maps are an adaptation of care plans that are now being utilized in some schools. After the clinical evaluation, the student will develop a concept map based on the client and the nursing process using whatever information is relevant. The use of a concept map allows for a visual component of the disease and links this relationship to the assessments, plan of care, interventions, and evaluation. The concept map allows the student to apply reason to the nursing process and understand how relevant information about the patient can be linked to interventions, assessments, and medications. When conducted collaboratively, the number of disease processes that are introduced to the student expands and the

repetition of the process allows working information about decision making (Ellermann, Kataoka-Yahiro, & Wong, 2006). Qualitative research regarding this type of critical thinking strategy is positive. It has been reported that students can construct a new concept map much more quickly after they have once constructed one. However, there has not been any quantitative research studies on how the concept map improves critical thinking or critical judgment.

Problem-based learning (PBL) has also been used as a strategy to promote critical thinking. It is student centered and self-directed, and the learning is oriented toward tasks or problems. Students are given scenarios, and they are required to seek out needed information and utilize new concepts to develop a solution to the problems that arise in the scenario. This can be done in small groups to promote a team approach. In addition, different points of view can be discussed, which is referred to as open-mindedness by Scheffer and Rubenfeld (2000) or as a “habit of the mind,” which facilitates critical thinking. In the literature, qualitative reviews have been used to evaluate the self-reported satisfaction of students and instructors, but, again, this approach does not evaluate critical thinking as an outcome of problem-based learning. Three studies that did look at measures of critical thinking included the work of Inouye and Flannelly (1998), who conducted studies on graduate nurses and found evidence that students who scored lower on initial critical thinking tests made the greatest gains over time, and those that scored higher initially did not show improvement or sometimes declined. Magnussen, Ishida, and Itaho (2000) conducted studies on undergraduate nurses over a four-year period of time and found similar results; those who scored lower initially made the greatest gains in critical thinking scores, whereas those who scored high to begin with showed little

improvement, if any. Ladoucer et al. (2004) identified a need for a standardized test to measure performance, and they developed a tool that assesses three constructs: self-directed learning, group process, and critical thinking (Worrell & Profetto-McGrath, 2007).

Other methods frequently used in the past to nurture critical thinking include case studies, also referred to as a problem-based approach. Nurse educators bring case studies into class discussions following certain clinical situations to explore many different possibilities of care. The student explores his or her own knowledge base and applies the newly discussed medical and nursing interventions that would apply to the situation. This approach promotes the use of cognitive processes that support clinical reasoning and critical thinking. This method of learning is also a student centered, active approach. The components of problem-based learning allow for individual self-direction, but they can also work well in collaborative groups. Problem-based learning supports the type of situations that students will experience in the clinical environment (Ousev, 2003). Research has demonstrated inconsistencies in the learning outcomes with this type of teaching strategy, and nurse educators continue to look for other approaches that may be more successful. The process of critical thinking in the clinical area should include a comprehensive assessment of the patient, an analysis, and prioritization of the patient's needs, followed by the application of evidence-based and outcome-directed interventions to resolve the problem.

Faculty who teach nursing can foster critical thinking growth by implementing specific teaching methods designed to develop these skills. Identifying barriers to the implementation of critical thinking teaching strategies is an important role to an educator,

to allow better validation of critical thinking skills in the students (Shell, 2001). Shell (2001) reported that the perceived barriers include eight different areas: self-efficiency, institutional barriers, time constraints, perceived importance and relevance of critical thinking, perceptions of student abilities and resistance, faculty resistance, perceived need to teach for content coverage, and a deficit of knowledge in the concept of critical thinking. A clear understanding of the potential barriers can enable the development of evaluation tools that can produce reliable results. It is impossible for nurse educators to prepare students for every contingency that may occur in their profession, but development of critical thinking skills will enable the new graduate to manage the healthcare environment and effectively provide care for patients (Brunt, 2005; Tanner, 2006; Twibell, Ryan, & Hermiz, 2005; Wilgis & McConnell, 2008).

Another strategy that has received considerable support in nursing education is simulation. Its popularity has gained support in some states, and some state boards of nursing have allowed simulation to be used in place of clinical hours. The National League for Nursing (2008b), during a call for education transformation in nursing, has positively endorsed its use.

Simulation is an attempt “to replicate some or nearly all of the essential aspects of a clinical situation so that the situation can be more readily understood and managed when it occurs for real in clinic practice” (Jeffries, 2007, p. 3). The first mechanical model appeared in healthcare in the 1960s with “Resusci Anne,” a full-sized mannequin used for training in cardiopulmonary resuscitation (Jeffries, 2007). In the 1980s, a modest increase in simulation took place in anesthesia, aviation, and military training. The technology boom of the 1990s took simulation to a new level, and it grew exponentially

as a spin-off of the Virtual Human Project and the genesis of the World Wide Web (Sliwka, 2008).

The last 10 years have witnessed an upward trend in the use of simulation in medicine and nursing education. Simulation is described in terms of fidelity, which reflects the degree of precision needed for the object replicated and is categorized as low, moderate, and high (Pennsylvania Center for Health Careers, 2008). Low-fidelity simulators, often referred to as task trainers, are practical for teaching skills and procedures, and these have been used in nursing education since the 1950s with the advent of Mrs. Chase, a life-sized doll. Simulators used as task trainer models do not feel like real body parts, but they offer the student an opportunity to practice the steps in a procedure with an object reflecting an anatomical likeness prior to performing the procedure on a real patient (Nehring & Lashley, 2010). Moderate-fidelity simulators have a pulse, blood pressure, and the capacity to breathe, but they do not look or feel like a real person. Vital-Sim, by Laeredal, is an example of a moderate-fidelity simulator, which can be used for skills acquisition. Because such simulators also have the ability to be programmed with changing pulses, lung sounds, and heart rhythms, they can also be used as patients that depict a health crisis and are used in emergent situations with the intent of developing critical thinking and clinical judgment skills. The simulated health crisis scenario challenges the student to actively use the nursing process in a problem-solving approach to determine how best the patient can be managed. Simulation can be utilized to augment theory by correlating classroom content in the context of the clinical area to bridge the gap between theory and clinical practice. Simulation can also be used as a formative or summative form of evaluation.

High-fidelity simulators have life-like qualities, including the capacity to cough, talk, blink, and the ability to physiologically respond to medical or pharmacological interventions. The advanced technology of high-fidelity simulation allows the student to be immersed in a clinical setting as the primary caregiver, and through observation, assessment and minute-to-minute monitoring, the student experiences what could happen in the status of an unstable patient. The student can evaluate the situation in the learning lab and intervene appropriately with nursing interventions or medical management to effectively resolve the problem in a safe environment without causing danger to a patient. This experience can be approached in a variety of ways, such as a team approach with each member representing a certain healthcare discipline, a family member of the patient, or a primary and secondary nurse working together as seen on the floor (Nehring & Lashley, 2010).

Formerly, the most common use of simulation as a pedagogy took place at the foundational level of nursing education in the learning lab and was used primarily to develop nursing skills. The student would practice the skill in a simulated learning lab using low-tech trainers, and once approved by the clinical instructor, he or she could take the skill to the acute-care setting where the task could be performed on a human patient. This strategy was effective in student mastery and retention of the procedural element and, by providing the opportunity to practice the skill on a human patient, the student nurse could also incorporate communication and interpersonal skills while performing the procedures. This methodology has been used for decades in skill acquisition, and it is credited in clinical hours of instruction.

In today's arena of nursing education, the use of trainers for skills training continues, but the opportunities to perform the procedure in the clinical area and benefit collaterally from an acute care setting are greatly limited. Using simulation to replicate the acuity of today's clinical setting may make it an effective strategy for clinical education in certain areas of nursing training. Learning labs created in nursing schools can be set up as quasi-clinical environments where students use partial trainers to practice and perform return demonstrations of a variety of skills. Return demonstration is a demonstration of a skill using a step-by-step approach in the presence of a qualified person who ensures that the student can perform the skill correctly. This level of skill acquisition continues today at the foundational level of nursing education where low-fidelity trainers are used for the practice of intravenous cannulation, urinary catheterization, and naso-gastric placement, and it allows the student to practice the skill and integrate the practice of confidentiality, privacy, and sterile technique in the learning lab before utilizing the skill on a human patient (Nehring & Lashley, 2010). Even though the opportunity for direct clinical contact with live patients is limited in today's healthcare setting, with simulation it is possible for the student to gain knowledge of the sequential steps of the procedure and gain confidence in skill performance prior to graduation.

Hovancsek et al. (2009) have pointed out that patient safety should be emphasized as an element of greatest importance in nursing education. A simulated experience for medication administration is another skill that is practiced in the learning lab at the foundational level, but this skill can be expanded into each level of nursing education with patient safety emphasized throughout each level. Prior to graduation, the student

could be required to achieve mastery in calculating, mixing, reconstituting, titrating, and distributing medications, with the assurance that each student can perform this skill without error. Additionally, using parenteral routes for medication administration provides the opportunity to practice sterile techniques and requires the student to identify appropriate landmarks and angles when injections are used. To be successful, the student could be required to deliver the appropriate medication using the appropriate delivery method and demonstrate the expertise to set up the equipment and program the machine if required. Simulated experiences using intermediate to high-fidelity simulators could be modified and adapted to each level of nursing education. The experiences performed in the context of a quasi-clinical area with higher-level simulators are capable of producing aberrations that mimic acute pathology that students are exposed to in class theory and then in the acute-care setting. Foundational nursing classes could begin the process of scaffolding for subsequent theoretical teaching and integration of that body of knowledge into the science of nursing. Higher-level students could benefit greatly if by the time they reached the rigor of advanced nursing classes, they had a working knowledge of clinical skills that are now routine by nature, allowing the students to apply more effort toward developing critical thinking and judgment levels. At this level, with the simulation embedded throughout the nursing program, more time could be devoted to emergency nursing, disaster management, and functioning in a charge position. Scaffolding such as this would continue to support and augment the theoretical teaching in the classroom and transference to an experiential level in the clinical arena.

Del Bueno was recently quoted by Horan (2009) as saying,

Only 35% of new RN graduates, regardless of educational preparation and credentials, met the entry expectations for clinical judgment. Although well versed in content, the majorities of graduate nurses are unable, or have considerable difficulty in translating knowledge and theory into practice. (p. 28)

Benefits that may be achieved utilizing more simulations in the educational arena are the increase in guided practice for student skill acquisition, skill in utilizing the nursing process in problem solving, and confidence building on the part of the student, without subjecting patients to risks or exposing the student nurse to fear of failure. The simulation experiences could effectively engage the student nurse in establishing the habits of safety in the management of medication preparation and administration, the recognition of changing trends in patient conditions, and the use of appropriate interventions to manage patient safely. As the level of nursing education progresses, the student could gain greater confidence in assessment skills by recognizing aberrations, becoming more familiar with medical treatments and nursing interventions, and have an unlimited opportunity to practice until mastery is attained. Another advantage for the student would be to analyze an error when one did occur; the student nurse would also have the opportunity to reflect on the experience, obtain immediate instructor feedback, and develop strategies to prevent further occurrences in the future. Simulation as a teaching tool also provides a student centered approach where the student is immersed in the experience and through active participation can process facts, emotions, interventions, and outcomes. The problem-solving approach used in the scenarios provides a mode of deep learning, practice in the use of the nursing process, and a greater understanding of

how theoretical knowledge is integrated within the nursing process to deliver nursing care. This approach provides an individualized learning experience and permits learning at the individual's own pace (Hertel & Millis, 2002; Kunzel & Hammer, 2006).

Student nurses have reported the benefits of becoming familiar with clinical procedures through simulation and feeling less anxiety and greater self-confidence when they later approached the clinical area of the hospital (Jeffries, 2005). The simulation experience is often performed in a group process that allows for individualized and also collaborative learning. This aspect of simulation could be utilized to develop the concept of team building, which correlates to working as a staff nurse on the floor, and illustrates how the idea of team performance improves outcomes by bringing together the strengths and skills of individuals and allows them to work and function collectively in a structured environment (Rothgeb, 2008).

Simulation is not without challenges or limitations in the education of nursing students. The cost of simulators is daunting, and even though the cost could be considered over an extended period, there are additional considerations. The cost of a moderate-fidelity simulator such as Sim Man is \$30,000, and the cost is commensurate with the technological capabilities of the simulator. Simulators that can adapt and respond physiologically to various medical and pharmacological interventions can cost in excess of \$150,000 (Corbett, Miles, Gantt, Stephenson, & Larson, 2008). Other issues that require consideration include the space to house the simulator, computer and technical support, video-taping capacity, and additional space for debriefing (Corbett et al., 2008; Jeffries, 2007).

Programming of the simulator requires an operator or additional faculty member trained in information technology with a background in medicine or nursing to incorporate and develop real-life scenarios and program them into the simulator. Time is needed to familiarize students with the simulator, to teach the support staff and faculty to operate the simulation, design the simulations, and provide faculty development in the technological components and basic operational functions of the mannequin. Additional ongoing support staff may be necessary to manage the ongoing equipment maintenance, troubleshooting, and repair of the simulator (Corbett et al., 2008; Jeffries, 2007). Schedule conflicts with time requirements could also be a limitation for a nursing school. Clinical days normally scheduled in the acute-care settings occur on various days of the week. Utilizing simulation in place of clinical hours could create scheduling difficulties and be time consuming for the simulation lab facilitator.

Limited simulators and quasi-clinical areas would mandate a greater frequency of need for setting up and taking down the simulation exercises. Further limitations of simulation include the reality that simulation cannot mirror the changes that occur in skin color, facial expressions, or the fear and anxiety that only a human patient can demonstrate (Jeffries, 2007; Rauen, 2004). Simulations cannot replace real-world human subjects and the interaction that accompanies the actual clinical experiences with patients and other healthcare providers. The hospital milieu itself contains many sensory stimuli that cannot be replicated in a simulated clinical environment. The acute-care setting also employs many different disciplines and healthcare providers at various educational levels who can contribute to and expand student learning and mentoring. Faculty resistance could be another limitation of simulation. Educators argue that simulations reduce the

amount of time spent in a real-world clinical setting, and there is a lack of research substantiating the effectiveness of this teaching strategy in the development of critical thinking. The National League for Nursing is optimistic regarding the use of this methodology to effectively bridge the gap between the classroom and clinical practice. The endorsement of the NLN has also motivated many nursing programs and academic institutions to purchase intermediate to high-fidelity simulation mannequins (Sanford, 2010).

A review of current nursing research evaluating simulation effectiveness has revealed limited results. Many of the studies that have evaluated simulation effectiveness have focused on the affective domain of learning, including self-confidence, anxiety, attitudes, and awareness, and have used a qualitative design. Research that has been done to evaluate the effectiveness of simulation on cognitive abilities such as critical thinking and clinical judgment has been scarce and has yielded mixed results. Sanford (2010) reviewed the literature and found several interesting studies. One study performed by Lasater (2007a) evaluated the following indicators in 48 students: self-report of confidence, student aptitude for critical thinking, qualitative assessment of clinical judgment skill during simulation, and the student experience followed by a focus group. This study indicated that 39 of 48 students responded favorably and indicated that simulation had increased their awareness of the clinical area and encouraged a greater consciousness of safety factors, such as checking for allergies and performing a more thorough examination of the medications they administered. With regard to negative comments received related to the simulation activity itself, the students reported feeling self-conscious and anxious when talking to a mannequin and assessing certain features

such as color and swelling that could only yield fabricated results because the mannequin, even though high-fidelity, could not simulate that aspect of the condition. This component of the simulation, they felt, took away from making the scenario realistic.

Another study by Williams (2001) evaluated the ability of 190 adult health students to recognize post-op complications. The researcher used Benner's theory of novice to expert to establish a protocol that aligned the student's abilities accordingly. Her findings indicated that even at novice levels, the abilities of students vary, and some students required more prompting and cues than others. It was also determined that placing time constraints on the simulated exercise created additional anxiety, and this could further influence the negative consequences during learning.

Ying (2009) conducted a study of first-year nursing students who received a report on a respiratory patient assigned to their care who developed a pleural effusion and required a thoracentesis. Upon entering the room to perform an assessment, the student finds the patient is breathless and has no pulse. Ying's findings identified one positive outcome of this simulation. He found that when the student is placed in such a scenario, the student begins to understand the relevance of the clinical area and has an increased awareness of his or her place in it. At that point, the students begin to manage the situation.

Schiavenato (2009) reported that simulation research has been highly restrictive and limited and believes that it is not in the best interest of students and educators to accept simulation, even high-fidelity simulation, without more rigorous studies regarding the learning outcomes. He acquiesces that there may well be advantages to simulation as a teaching strategy, but before substituting simulation for clinical hours, he advises that

research to support its effectiveness should be evident. The studies that have been performed have produced mixed results, and the small sample sizes have not made their findings generalizable.

Cant and Cooper (2010) reviewed the use of medium to high-fidelity mannequins compared to other teaching modalities in nursing. After conducting a systematic review of the quantitative studies published between January 1999 and January 2009 using seven different databases, 12 studies were found that met their criteria for an experimental or quasi-experimental design. Their findings indicated that of the 12 studies, 6 studies showed an increase in knowledge, critical thinking ability, and satisfaction or confidence compared to a control group. The reliability and validity varied because there was lack of uniformity in the design, and the studies used varied methods to measure the outcomes. The studies they evaluated did not describe where the students were in their educational level of nursing or the alternate strategies of teaching that were used with the control group, making it difficult to attribute the gains in knowledge and critical thinking to the simulation (Cant & Cooper, 2010).

A confounding finding that might help to explain the paucity of research in nursing simulation is the lack of an efficient evaluation tool. A review of published evaluation instruments used for human simulation in the literature indicated that, at present, there are a total of 22 evaluation instruments; seven of these are under continued modification. The problems that are encountered with these instruments are the lack of reliability and validity reported with their use. The tools that have been developed, or that are under evaluation, measure learning in the psychomotor, affective, and cognitive domains (Herm, Scott, & Copley, 2007; Lasater, 2007b; Radhakrishnan, Roche, &

Cunningham, 2007). One recommendation for developing a tool is that researchers use and refine several instruments and consistently use them to build reliability and validity. The self-report data collected by many researchers in the affective domain do not provide the needed information to evaluate the learning outcomes in all domains of clinical nursing education (Adamson, 2010).

This chapter has chronicled the past 100 years of nursing history and some of the changes the profession of nursing has experienced. Additionally it has summarized the 21st century and the obstacles that nurses will likely experience, as well as the barriers of the nurse educators will who prepare them. The educational methods that have been used to promote critical thinking/clinical judgment and the success that those methods have manifested are presented.

CHAPTER III

METHODS

The purpose of this study was to explore the effects of using simulation and didactic instruction on critical thinking and clinical judgment with student nurses enrolled in a fall semester medical-surgical class. Specifically, it was of interest to compare the performance of these fall semester nursing students with the performance of students enrolled in a spring semester class who received only didactic instruction, with lecture, case studies, and videos. This chapter includes a description of the participants, instruments, and procedures utilized in this study.

Participants

The study took place across Fall Semester 2011 and Spring Semester 2012 in the Nursing Department at a Midwest university in North Dakota. While there were approximately 100 student nurses enrolled in this department, only those enrolled in a senior level medical-surgical class were involved. By the time these senior level nursing students arrived in this course, they had completed nursing courses in Foundation, Assessment, Maternal Newborn, Mental Health, Pediatrics, and two semesters of a medical-surgical class. The fall semester class became the experimental group (wherein the three hours of didactic instruction was paired with simulation), and the spring semester group became the control group (with only three hours of didactic instruction provided). Student nurses in each non-randomized group were given a description of the

research study and, if interested, were asked to sign consent forms (see Appendix A). The fall semester medical-surgical class (experimental group) had an enrollment of 15 student nurses; all signed the consent form. The spring semester medical-surgical class (control group) had an enrollment of 15 student nurses; only 8 student nurses signed the consent forms. The experimental group consisted of 14 females and 1 male, while the control group consisted of 6 females and 1 male after one student dropped.

Instruments

The California Critical Thinking Skills Test (CCTST) was the instrument used in this study to evaluate critical thinking. Critical thinking is a generalized term used by many disciplines with no universal definition. In this study, the definition of critical thinking used was that of the National League for Nursing (NLN) as follows: “Critical thinking in nursing practice is a discipline specific, reflective reasoning process that guides a nurse in generating, implementing, and evaluating approaches for dealing with client care and professional concerns” (National League for Nursing, 2008a, p. 2). The CCTST is one of many instruments developed by Insight Assessment (2012) and published by the California Academic Press. The CCTST is a standardized test with items in the multiple choice format. This particular critical thinking test is non-discipline specific, but content knowledge is presumed. The CCTST is developed with subsets that progressively analyze and interpret information present in text, charts, or images; draw accurate inferences from the data; explain why a given evaluation is strong or weak; and determine whether inductive or deductive reasoning is used. The test has 34 multiple choice questions that range in level of difficulty and complexity. The tests can be taken in a proctored classroom environment with paper and pencil or it can be taken online. The

tests were given in the classroom with paper and pencil and a 45-minute restriction was observed. In this study, the tests were administered and proctored by the researcher. The tests were evaluated by Insight Assessment, which then provided the researcher with an overall measure of critical thinking skills, and the scores for five individual subsets that included Induction, Deduction, Analysis, Inference, and Evaluation. All of these subsets are important in the discipline of nursing, because they allow the nurse to recognize salient aspects of an undefined clinical situation and interpret their meaning and respond appropriately (Slager & Bartels, 2009). The CCTST was given to the participants in the experimental group and the control group before the medical-surgical class began and again after the primary content of the class was completed. All pretests and posttests for both groups were sent to Insight Assessment at the same time. This procedure was requested by Insight Assessment, and they identified students in the fall 2011 experimental group as Group I pretest and posttest and the spring 2012 control group as Group II pretest and posttest.

The California Critical Thinking Skills Test (CCTST) was selected for this study because of its documented credibility, the fact that it has been used in many studies conducted in the discipline of nursing, and its subset categories are very relevant to nursing. Item analysis and reliability has documented a Kuder-Richardson internal consistency of -20 ranging from .68-.80.

This statistic is comparable to Cronbach's alpha used for dichotomously scored instruments and scales. For an instrument with multidimensional scales, a KR-20 above 0.70 indicates a high level of internal consistency (Insight Assessment, 2011 p. 48). The content validity for the California Critical Thinking Skills Test in the domain of critical

thinking is identified by the APA Delphi Research group. The test construction of cognitive skills in interpretation, analysis, evaluation, and inference was a product of the APA Delphi Research Group, and has been supported by educators, researchers, and other professionals who support the adoption of this exam for curricular research projects both nationally and internationally (Insight Assessment, 2011). The construct validity has been under the scrutiny of psychometric item analysis methods and, in addition, a protocol analysis developed by Drs. Peter and Noreen Facione, who collaborated with other researchers. They used a talk aloud format to assess whether the selection of a correct answer choice reflected the application of cognitive skills (Insight Assessment, 2011, p. 45). Evidence of construct validity is measured by improvement in students' CCTST scores after they have taken a course in critical thinking or educational program training in clinical reasoning. Further validation is present in peer-reviewed independent research; the California Critical Thinking Skills Test has been reported to capture gains in critical thinking skills after only a few weeks of critical skill training. Criterion validity is the most important consideration in the validity of a test, and the CCTST provides predictive value in peer-reviewed, independent published research. Various forms of the CCTST have demonstrated strong correlations with other instruments that include a measure of critical thinking or higher order reasoning. High correlations have identified on standardized tests of college level preparedness (GRE Total score r /Pearson $R=.710$, $p,.001$; GRE Analytic $r=.708$, $p,.001$; GRE Verbal $r=.716$, $p,.001$; GRE Quantitative $r=.582$, $p,<.001$ (Insight Assessment, 2011).

The second instrument used for the study was a modified Lasater Clinical Judgment Rubric. The Lasater Clinical Judgment Rubric measures clinical judgment in

four subscales: Assessment (process of gathering, verifying, and communicating data about a patient); Diagnosis (a statement of an actual or potential response to a health problem that the nurse is competent and licensed to treat); Interventions (things the nurse plans to do to help the patient achieve a goal); and Evaluation (determination of the patient's ability to perform the behavior identified in the goal) ("Nursing Process Steps," 2011). The subscales of the rubric are further defined in descriptive behaviors or critical thinking. The rubric is used in a clinical simulation lab and "provides structure and consistency in evaluating student behaviors during lab exercises" (Slager & Bartels, 2009). Scoring of the rubric subscales provides the performance results. This method is used as a tool in grading and provides feedback in debriefing sessions with students. The sum of each category will result in a designation of one of the following categories: Exemplary, Accomplished, Developing, and Novice.

The Lasater rubric was chosen for this study, because it integrates clinical behaviors with clinical practice within the nursing process. Integration promotes clinical judgment, an outcome of critical thinking, critical reasoning, and the nursing process (Alfaro-LeFevre, 1995). The Lasater rubric generalizes the constituents of the nursing process and provides a means of evaluating each step and ability to "think like a nurse" (Tanner, 2006).

The Lasater Rubric was modified for the purposes of this study to more easily quantify the data. All students enrolled in the advanced medical-surgical class are required to participate in the clinical performance simulation at the completion of the semester. The rubric was modified to specifically address all components of each of the simulation scenarios. In place of the written entries designating behaviors for each

category, each scenario contained an itemized checklist of expected behaviors that could be easily checked, if present. The scenario was videotaped using the available technology in the simulation lab, which provided a three-view video feed that could be reviewed in any view as often as needed. The student took part in three simulations; in two of the simulations, they were assistants to the charge nurse who delegated random nursing tasks. In one of the three scenarios, they were the charge nurse and directed all care of the patient; this is the one on which they are assessed. The three clinical simulations reflected content covered throughout the semester and included a patient with chest pain, a motor vehicle crash, a respiratory patient, and a patient with diabetes mellitus type II. All students had received the content covered in the simulation and may have had the opportunity to care for this type of patient in one of the clinical rotations, given throughout the semester.

Procedures

Prior to the implementation of this study, the approvals by Institutional Review Boards were obtained. All data obtained from the study were coded to protect the anonymity of the participants.

On the first day that the Adult Medical-Surgical III class met, the syllabus was reviewed and the research study was introduced. The purpose of the study, the instruments used, the informed consent, and the expected outcome were discussed and other questions were answered. The student nurses interested were directed to sign up on the roster provided. The 15 students in the class all agreed to participate. The informed consents were signed and the CCTST pretests taken. The teaching strategy was then implemented. The Adult Medical-Surgical III class met 16 times throughout the semester

for three hours. During 8 of the 16 class days, the lecture portion of class consumed the first two hours of the class session. On those days, the last hour of class was moved into the simulation lab where the lecture content was integrated into the simulation lab. Prior to class, the appropriate equipment, medications, and medium-fidelity mannequin were programmed to reflect specific health conditions discussed in the lecture. In addition, four flip charts were placed around the simulation lab and each was titled with the steps of the nursing process: Assessment, Diagnosis, Interventions, and Evaluation. An example of the integrated section follows.

Topic: Cardiac

Simulator: John Smith, 44 years old with chest pain. Simulator programmed with a heart monitor displaying sinus tachycardia with a heart rate of 120 beats per minute, respiratory rate of 22, and oxygen saturation is 88%.

Instructor: Introduced the patient and his complaint to the students. First step of the nursing process is assessment.

Instructor asks: At this point do we have any assessment?

Pause: For student response.

What constitutes an assessment?

Instructor answers: We know he has chest pain. How does that direct his care?

Pause: Student response.

Instructor asks: What do we need to know about that chest pain?

Teacher/student reinforced answer:

What kind of pain? Is it sharp? Dull? When did it start? What were you doing when it started? What have you tried to do to make it go away? Did it help? Do you have any other symptoms? Nausea/vomiting, shortness of breath, diaphoresis?

Instructor: Is there anything specific that we should be thinking or doing? The next step of the nursing process is planning/diagnosing. At this point is there any nursing diagnosis at which we should be looking? Pain, fear, and alterations in cardiac output. Are these important?

Instructor/student reinforced answer: Yes, because each of these symptoms can affect the heart. Pain increases the heart rate, fear increases the heart rate, and when the heart rate goes up so, too, is the heart's demand for oxygen. This is why we place any patient who comes in with chest pain on a monitor and give the patient oxygen. This is within the intervention portion of the nursing process.

Instructor: This patient could be experiencing a myocardial infarction, congestive heart failure, pneumonia, pericarditis, or anxiety. Do we know? No, there is no diagnosis, no evidence, and nurses can't diagnose medical conditions; however, when we talked earlier about the heart and what can cause pain? Hypoxemia can cause pain.

Instructor: What can a lack of oxygen do to the heart? Can cause arrhythmias, and myocardial infarction so what should we do?

Pause: Student response.

Instructor: We need to give him oxygen, place him on the monitor to assess for arrhythmias and next we need to see how his body is being affected by the chest pain, so we check vital signs.

We check his vital signs and see that his blood pressure is 160/88, pulse is 122, respiratory rate is 22, and his pulse oximeter is 88%. Does this tell us anything?

Pause: Student response.

Instructor/student reinforced answer: Heart rate is too fast, the faster the heart rate the harder the heart works. If this person is having a myocardial infarction do we want his heart to work harder? No, we also see that his blood pressure is high.

Instructor: What else do we have for assessment now? Man is 44 years old, has chest pain, no relief of pain in an hour, high pulse rate, high blood pressure, what other information might be helpful?

Pause: Student response.

Instructor reinforced answer: Medical history, medications, allergy history. Why would this be helpful? We only know about this patient in what he tells us of his history and what we can see. We also would do a head to toe assessment.

In any situation where you have a patient who complains of chest pain, you always veer on the side of myocardial infarction until you know differently. An intravenous access should be started so medications can be given quickly if needed. Oxygen is given immediately and now the physician will be called.

Instructor: What diagnostic tests will the physician order?

Pause: Student response.

Instructor reinforced answer: Troponin, CPK- MB, and EKG, why are these ordered?

Pause: Student response.

Instructor: At this point unless standing orders were implemented the nurse would ask the physician for a pain medication for the patient. What pain medication is ordered for chest pain?

Pause: Student response.

Instructor: When we look at the Nursing Process: Intervention: What have we done?

Ok, we have placed the patient on the monitor, taken vitals, performed a head to toe assessment, given the patient oxygen, and started an intravenous access, given the patient pain medication, ordered labs and an EKG.

Instructor: Last phase of the nursing process is evaluation, what are we evaluating?

Pause: Student response.

Instructor: How is he doing? Has his pain gone away? Has his heart rate gone down?

Are labs back? If they are, has he had an MI? Is it our job to look at the labs? Yes, because if he rules in for a myocardial infarction, will that have meaning for the nurse? Yes, he will either go to cardiac catheter lab, open heart surgery, or the Intensive Care unit.

The evaluation is ongoing, anytime the patient is in your care and you are administering interventions, or the condition is changing, you need to evaluate, and document the interventions performed, and the outcomes of those interventions.

The integrated simulation lab with lecture occurred eight times over the fall semester. Each session contained content from other body systems, but as the semester progressed, the patient could manifest more than one co-existing medical condition. The simulation lab was always set up with the appropriate equipment, medications, crash cart, suction, and oxygen always available.

The control group had integrated care plans and videos throughout the three hours of lecture. They had more medical intervention introduced than the experimental group.

CHAPTER IV

RESULTS

The purpose of the study was to measure the impact of a new teaching strategy on students' critical thinking and clinical judgment. The second cohort of participants did not receive the teaching strategy intervention; instead, they functioned as a control group to account for variability other than the planned intervention. Both groups were administered the California Critical Thinking Skills Test twice: A pretest was given to both groups early in the semester before class content was given, and a posttest was given to both groups after the class content had been delivered. The same instructor taught both semesters. The clinical judgment portion of the study was evaluated after the course content had been given and completed at the end of the Adult Medical-Surgical III class. A modified version of the Lasater Critical Judgment Rubric was used to generate a quantitative comparison.

In this chapter, the participants in control and experimental groups are described in terms of their similarities and differences. Next, the evaluation tools that were used and the results that were obtained from both groups' pretest scores (before the strategy was implemented) and posttest scores (attained after the course content had been delivered) are provided. A statistical analysis was used to evaluate the results and ultimately to answer the research questions: Did the incorporation of simulation with didactic instruction in a fall semester medical-surgical class result in significantly higher scores on

the California Critical Thinking Skills Test when compared to the ratings of student nurses receiving only didactic instruction in the spring semester? Further, did the incorporation of simulation with didactic instruction in a fall semester medical-surgical class result in significantly higher ratings of clinical judgment when compared to the ratings of student nurses receiving only didactic instruction in the spring semester?

The experimental group consisted initially of 14 students who were invited to be part of the study and willing to take the CCTST at the beginning of the semester and at the end of the semester. Eleven of the participants completed the pretest and posttest (n=11). The control group consisted initially of seven students who completed the pretest and eight who completed the posttest. Participants who completed both the pretest and posttest are described in Table 1.

Table 1. Study Participants.

	Control Group n=7	Experimental Group n=11
Ethnicity		
Chose not to respond, %	28%	18%
Hisp,Latino,Mexican Am, %	14%	
White,Cauc,Anglo Am, %	57%	8%
Gender		
Chose not to respond, %	14%	18%
Female, %	71%	63%

When one considers that the university is located in the northwestern part of North Dakota, it is interesting to look at the two groups who participated in the study. The Nursing Department at a Midwest university accepts 18 students in the fall semester and 18 in the spring semester. In the experimental group, 5 of the 11 participants were from North Dakota and the remaining participants were from other parts of the United States. This is not an unusual occurrence, since a military base is close by, and often the spouses of the enlisted military persons return to school to complete or start their careers. Fall semester 2011 was a difficult time for this class. The experimental group consisted of several students who had been victims of a flood and many had lost their homes. Several of the students had spouses deployed, and two of those had lost homes to the flood and had spouses deployed. Nonetheless, there was cohesiveness within this cohort; they were actively engaged in their learning. The control group, however, was much different: This group consisted of older-than-average (OTA) students with children. Their learning was congruent with Malcolm Knowles' adult learning theory, who believed that those who taught the adult learner needed to address the following: (a) make certain that adult students understand "why," (b) respect that students have different learning styles, and (c) allow students to experience what they are learning (Pettersen, 2004). The control group also had numerous periods throughout the semester during which there was discord, as well as distractions. The two groups were alike in that they were all first level senior students; they were ready to be done with school, yet appeared to be compassionate people who would be caring in their jobs.

In Table 2 and Figure 1 are summarized results of administrations of the CCTST. Additionally, at the end of the semester, all students participated in a video recorded

Table 2. Results (Mean, Standard Deviation, Range) From Administration of the California Critical Thinking Skills Test.

	Control Group, n=7		Experimental Group, n=11	
	pre	post	pre	post
Scale scores				
Induction	10.6 1.90	9.0 1.15	9.1 1.92	9.5 2.77
	8 – 13	7 – 10	7 – 12	4 – 14
Deduction	6.9 2.91	7.6 2.76	7.3 2.87	7.5 1.63
	3 – 11	4 – 12	3 – 13	5 – 10
Analysis	4.0 1.29	4.0 1.73	3.9 1.70	4.2 1.08
	2 – 6	1 – 6	1 – 6	3 – 6
Inference	9.1 2.34	8.3 2.14	8.5 2.54	8.4 3.11
	6 – 12	5 – 12	5 – 12	4 – 13
Evaluation	4.3 1.38	4.3 1.50	4.0 1.41	4.4 1.29
	2 – 6	2 – 6	2 – 6	3 – 7
Total scores	17.4 4.58	16.6 3.60	16.4 4.37	16.9 3.59
	11 – 23	12 – 22	11 – 24	11 – 22

simulation. The results of the CCTST follow the student population scores (nursing students) and data from a large general population who had taken the same test. The findings show that both groups fall within one standard error of the Average National Score (16.9, with standard deviation = 5.21). Furthermore, the standard deviation for each group is lower than national norms. Thus, our students were fairly well “matched.”

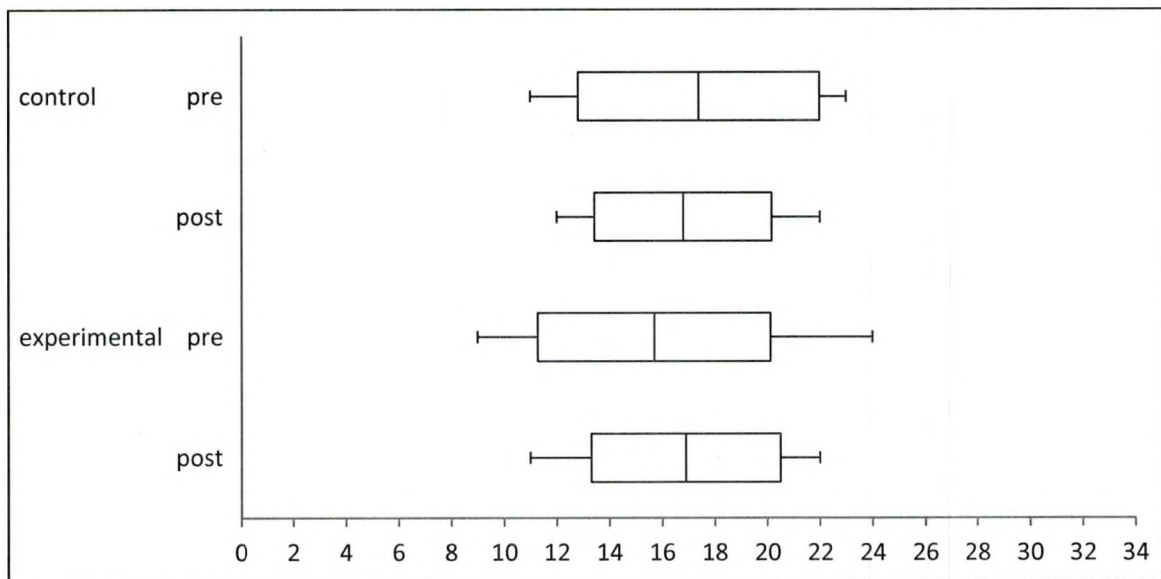


Figure 1. A John Tukey Horizontal Box and Whisker Plot of Means (Vertical Line in the Box), Box, and Ranges (Whiskers) of Pretest and Posttest Scores. Adapted from “Variations of Box Plots,” by R. McGill, J. W. Tukey, and W. A. Larsen, 1978, *The American Statistician*, 32(1), p. 12.

The testing company (Insight Assessment) was asked whether the results would be valid using the national norms (published in their manual) to compare our student population. Their response indicated that comparing the national statistics with the data from any study provides a relevant comparison (Insight Assessment, 2011).

Analysis of the pretest versus posttest scores of the control group and experimental groups was planned to evaluate the effect of the teaching strategy; two dependent *t* tests were selected. Tests for normality of difference scores are summarized in Table 3. Kolmogorov-Smirnov and Shapiro-Wilk statistics (Zimmerman, 1997) significance levels greater than 0.05 indicated no significant deviations from normality.

Table 3. Tests for Normality of Difference Scores: Assumption for Application of Dependent *t* Tests.

Group	Kolmogorov-Smirnov ^A			Shapiro-Wilk		
	statistic	df	significance	statistic	df	significance
Control	.199	7	.200 ^B	.937	7	.616
Experimental	.202	11	.200	.947	11	.604

^A with Lilliefors significance correction

^B represents the lower bound of the true significance

Dependent *t* test results are summarized in Table 4, along with test-retest (three months) correlations. Based on the results obtained after a three-month period, a decrease in average test scores was seen in the sample. To further explore the rationale behind this result, one might need to look at external factors that may have affected the test takers during the pre and post phases. These factors were not considered at the time the test was administered. As such, there were no statistically significant changes in the critical thinking scores.

Table 4. Test-Retest Correlations and Dependent *t* Tests to Index Differences in Pretest and Posttest Scores.

Group	n	Correlation	Significance	Mean diff	<i>t</i>	df	Significance
Control	7	.404	.368	-.72	.087	6	.933
Experimental	11	.681	.021	.14	-.727	10	.484

The second research question asked: Did the incorporation of simulation with didactic instruction in a fall semester medical-surgical class result in significantly higher ratings of clinical judgment when compared to the ratings of student nurses receiving only didactic instruction in the spring semester?

The participants of the experimental group had eight lectures that also included scenarios in the simulation lab to demonstrate a health condition presented in the preceding lecture. The simulation lab was set up much like an emergency room or intensive care room to familiarize the students with equipment and medications that would possibly be used in a real medical situation.

The Lasater rubric is based on Benner's (1984) theory and the stages a nurse will go through to become an expert, and also the nursing process. The nursing process is the decision tree that has been taught in nursing school for decades; this process is a common thread and an essential to provide holistic care in any area of nursing practice. The Simulated Clinical Performance Evaluation was originally based on all four subcategories of the Lasater Clinical Judgment Rubric: Assessment, Plan, Intervention, and Evaluation. However, after watching the videotapes, it was apparent that it would not be possible to score the plan category without minimizing the importance of the other sections for the total score. The planning stage was not obvious, in lieu of the interventions performed; however, some thought was given before the intervention. The plan phase was eliminated for this reason. The results of the video analysis are summarized in Table 5. The rubric was developed around four medical scenarios (see Appendix B). Each rubric was designed for the scenario chosen with interventions and procedures selected according

Table 5. Results (Mean, Standard Deviation, Range) From Video Performance Data.

	Control Group n=7	Experimental Group n=11
Scale scores		
Assessment	5.3 0.76 4 – 6	5.3 1.85 2 – 9
Intervention	4.0 1.41 3 – 7	3.8 0.75 3 – 5
Evaluation	0.3 0.76 0 – 2	1.0 1.18 0 – 3
Total scores	9.6 1.13 8 – 11	10.1 2.02 8 – 15

to the scenario provided. This explains why the numbers in the rubric are not uniform. The students were rated on the steps of the nursing process. All scenarios utilized in this study reflected healthcare conditions studied this semester for both groups. In the subcategories, there was greater range of scores in the experimental group, and this was most pronounced in the assessment category.

CHAPTER V

SUMMARY, DISCUSSION, LIMITATIONS, AND RECOMMENDATIONS

The purpose of this study was to explore the effects of using simulation and didactic instruction on critical thinking and clinical judgment with nurses enrolled in a fall semester medical-surgical class. Specifically, it was of interest to compare the performance of these fall semester nursing students with the performance of students enrolled in a spring semester class using only didactic instruction. This chapter begins with a summary section that includes the background of the study, an overview of methodology utilized, and results of the study with respect to the literature. Limitations of the study and recommendations for nursing education are described in the final two sections.

Summary

Background of the Study

The impetus for the study was notations in the literature regarding a widening gap between what nurses learned in school and how they performed in clinical practice. Specifically, new nursing graduates were not demonstrating critical thinking skills in hospital settings, causing these hospitals to call for more “experienced” nurses (Del Bueno, 2005). As a nurse educator, the researcher became concerned that graduates of this institution were not getting positions because they lacked experience. She reasoned that if lectures delivered in the medical-surgical class were linked more closely

with clinical practice, its graduates may be able to improve critical thinking skills and be better able to deal with new clinical situations.

Two research questions were posed as follows:

1. Did the incorporation of simulation with didactic instruction in a fall semester medical-surgical class result in significantly higher scores on the California Critical Thinking Skills Test when compared to the ratings of student nurses receiving only didactic instruction in the spring semester?
2. Did the incorporation of simulation with didactic instruction in a fall semester medical-surgical class result in significantly higher ratings of clinical judgment when compared to the ratings of student nurses receiving only didactic instruction in the spring semester?

Overview of Methodology

The study took place across Fall Semester 2011 and Spring Semester 2012 in the Nursing Department at a Midwest university in North Dakota. While there were approximately 100 students enrolled in this department, only those enrolled in a senior level medical-surgical class would be involved. By the time these senior level students arrived in this course, they had completed nursing courses in Foundation, Assessment, Maternal Newborn, Mental Health, Pediatrics and two semesters of a medical-surgical class. The fall semester class became the experimental group (wherein didactic instruction was paired with simulation), and the spring semester group became the control group (with only didactic instruction provided).

The California Critical Thinking Skills Test (CCTST) was the instrument used in this study to evaluate critical thinking; it was given to the participants in the experimental

group and the control group before the medical-surgical class began and again after the primary content of the class was completed. All pretests and posttests for both groups were sent to Insight Assessment at the same time. This procedure was requested by Insight Assessment, and they identified students in the fall 2011 experimental group as Group I pre and posttest, and the spring 2012 control group as Group II pre and posttest.

The second instrument used for the study was a modified Lasater Clinical Judgment Rubric. The Lasater Clinical Judgment Rubric measures clinical judgment in four subscales: Assessment, Diagnosis, Interventions, and Evaluation. The Lasater rubric was chosen for this study, because it integrates clinical behaviors with clinical practice within the nursing process. The Lasater rubric was modified for the purpose of this study to more easily quantify the data. All students enrolled in the advanced medical-surgical class are required to participate in the clinical performance simulation at the completion of the semester. The rubric was modified to specifically address all components of each of the simulation scenarios. In place of the written entries designating behaviors for each category, each scenario contained an itemized checklist of expected behaviors that could be easily checked, if present. The scenario was videotaped using the available technology in the simulation lab, which provided a three-view video feed that could be reviewed in any view as often as needed. The students took part in three simulations; in two of the simulations, they were assistants to the charge nurse who delegated random nursing tasks. In one of the three scenarios, they were the charge nurse and directed all care of the patient; this is the one on which they are graded. The three clinical simulations reflected content covered throughout the semester and included a patient with chest pain, a motor vehicle crash, a respiratory patient, and a patient with diabetes mellitus type II. All

students had received the content covered in the simulation and may have had the opportunity to care for this type of patient in one of the clinical rotations, given throughout the semester. The integrated simulation lab paired with lecture occurred eight times over the fall semester. Each session contained content from different body systems, but as the semester progressed, the patient could manifest more than one co-existing medical condition. The simulation lab was always set up prior to class with the appropriate equipment, medications, crash cart, suction, and oxygen always available.

Discussion

Research Question One

The experimental group's scores on the CCTST were slightly higher on the posttest than on the pretest. The control group's scores on the CCTST showed a slight but not significant decrease from pretest to posttest. There was no significant effect of the teaching intervention assessed by the CCTST. No obvious explanation could be identified.

In 2010, a systemic review of simulation studies was done (Lapkin, Levett-Jones, Bellchambers, & Fernandez, 2010). The objective was to identify the best evidence of effectiveness for high-fidelity simulation through the years of 1999-2010. The selection process itself was tedious, initially finding over 1,600 publications that matched in the key words used for the search. Deciding the findings was overwhelming; a tighter selection process was used to focus on clinical reasoning, critical thinking, knowledge acquisition, and the ability to identify a deteriorating patient. Their search found 21 studies that matched those variables. Only three studies focused exclusively on critical thinking and simulation. The interventions used were not uniform nor was the manner in

which the groups were tested. Two of the three studies showed improvement in critical thinking and one of the three studies showed mixed results (Howard, 2007; Ravert, 2008; Schumacher, 2004). The study with the mixed results used three groups of students; one group had a combination of classroom and simulation, one had just classroom, and the third one had just simulation. Findings showed improvement with the combination group and the simulation group. That study more closely reflected this study; however, the testing was done after three learning sessions had been completed. The testing instrument was a *HESI* exam, which is a specialty exam developed to assess students' knowledge and their ability to apply nursing concepts within specific content area (Morrison, Adamson, Nibert, & Hsia, 2004). The testing occurred pretest with a *HESI* 60-point exam and a 20-point posttest completed after three sessions. The findings indicated that the lecture only group had no improvements, whereas the groups linked with simulation and lecture and just simulation both noted improvements. The researchers examining these studies on critical thinking and simulation summarized their work by noting that all three studies had methodological shortcomings; convenience samples were exclusively used, and small sample sizes limited any ability to detect influence of the interventions on the outcomes. Finally, there was a lack of valid, reliable tools (e.g., some of the instruments used measured knowledge and critical thinking to evaluate clinical reasoning).

Research Question Two

The clinical performance scores of the control group and the experimental group on the Lasater Critical Judgment Rubric were quite similar. The mean of the control group and the experimental group was essentially the same. The range of scores within each group was also comparable. The largest range appeared in the assessment category.

Each scenario had its discriminating features; for example, some of the scenarios would require students to identify the cardiac rhythm of a patient and notice if the rhythm had changed during the time care was provided. When assessments occurred, and students did not notice these changes, it would result in a loss of points on the rubric. In retrospect, students who were given cardiac patient scenarios may have a more difficult task than students who were given a different type of patient. This may have resulted in inequitable scenarios. Nonetheless, as Rhodes and Curran (2005) point out, the dynamic climate of healthcare requires that new graduates assume complex roles that demand the acquisition of clinical reasoning in undergraduate classes. The need for students to practice and become adept at noticing patient deterioration is important; the rapid transfers of patients to the intensive care units from the medical and surgical areas require nurses to be in a state of vigilance.

There is also not a reliable instrument to test clinical judgment. In the study done that analyzed 21 studies of 1,600 on three different levels (knowledge acquisition, critical thinking, and clinical judgment), the results indicated that the instruments used to study critical thinking and knowledge acquisition were used to study clinical judgment. The rationale used was the logical progression to clinical judgment: If you have knowledge and critical thinking skills, you logically would have good clinical judgment (Lapkin et al., 2010). Since there were no pretests given for clinical judgment in this study, there were only the results of each of the two groups. Didactic instruction paired with simulation provided to the experimental group did not produce clinical judgment scores that were significantly better than didactic instruction alone provided to the control group.

Limitations

The first limitation of this study relates to the size of the participant groups; both were small. The control group and experimental group were involved at different times and because they were not done at the same time, factors may have influenced the results. A second limitation might have been in the timing of the study; a major flood had destroyed homes in the geographical location of the study, and several students in the experimental group had lost their homes. Because the Midwest university is near a military base, students in both groups also had partners deployed overseas at the time of this study. The control group was comprised of largely older-than-average students with children. Their attitudes differed from those of the experimental group; they were slightly less engaged and experienced more discord among themselves. Both groups were taking finals in other classes and found it difficult to fit in the posttest for critical thinking.

A third limitation related to the critical thinking test chosen. The California Critical Thinking Skills Test is a general test of critical thinking and not linked specifically to a medical discipline. While certain inferences can be drawn from this test, it may not be helpful in guiding nurse educators identify areas requiring further instruction.

Recommendations

For Nurse Educators

Curriculum for nursing students should be designed so that the use of simulation for skills development, assessments, and practice in the application of theoretical knowledge in clinical settings is a continuous thread from their first semester in the program. A simulated environment allows students to have an opportunity to practice

complex decision making, using the nursing process. This environment should expose student nurses to as many situations as possible for skill acquisition. Areas for nurse educators to include in their clinical curriculum are suggested by Finkelman and Kenner (2009, p. 244): monitoring of patient status, providing physiological therapy to patients, assisting patients to compensate for loss of function, providing patients emotional support, and providing education to patients and their families in terms of integrating and coordinating care.

Nurse educators should work with the institutions that provide their students internships so that they might have more experience in these settings. Collaborative relationships must be established with various medical disciplines so that nursing students are provided different points of view. In particular, students need more experience in hospital settings so that they might understand how hospitals function as a whole.

Educators attempting to develop clinical judgment could have students be their own control monitors. An example might require the student to create a list of medical supplies, medications, and equipment that a patient with a certain condition might need. Instead of setting up a simulation lab to create a hospital-like environment, the student has to put in the environment what might be needed for a patient with chest pain. An assignment where the student has to think about it, read about it, determine the rationale, and then assimilate it may improve his or her knowledge and clinical judgment.

For Future Research

Further research should be conducted to develop tools that measure critical thinking specific to the discipline of nursing. There is difficulty in gaining any validity or

reliability since none of the tools available have been utilized enough in the field of nursing to establish reliability or validity.

Research in the development of high-fidelity simulation research is needed in how communication can be evaluated. Students oftentimes use technology to communicate and may need to practice on patients who have sensory deficits, language diversity, or lack of understanding of medical terminology.

APPENDICES

Appendix A Informed Consent

INFORMED CONSENT

TITLE: Clinical strategies that can improve clinical judgment.

PROJECT DIRECTOR: Rita Meyer

PHONE # 701-240-5210

DEPARTMENT: Teaching/Learning

STATEMENT OF RESEARCH

The research project requires participants to sign an informed consent. The participant who consents to this study will take a Critical Thinking Exam before the teaching strategy is used, and after the semester is completed. The participant is also willing to expose the video-taped scenario to a rubric intended to evaluate clinical judgment. There are no risks involved in this study. Please take your time in making your decision to participate and feel free to ask any questions you might have.

WHAT IS THE PURPOSE OF THIS STUDY?

The purpose of this study is to determine whether when classroom and clinical content is guided by the nursing process and simulated activities improves the student's ability to make good clinical judgments.

HOW MANY PEOPLE WILL PARTICIPATE?

Approximately 30 people will be involved in this study.

HOW LONG WILL I BE IN THIS STUDY?

Your participation in the study will end at the completion of the critical thinking exam at the end of the semester.

WHAT WILL HAPPEN DURING THIS STUDY?

This teaching strategy will be used for all students enrolled in Adult Health III. Those who choose to participate in the study will take a pre- and post-critical thinking exam and the simulation clinical scenario that the participant is involved with will be evaluated in the same manner as those who do not participate and also a rubric that is specifically looking for examples of clinical judgment. The student will also complete a survey that queries how the participant felt about the teaching strategy, and whether they feel they benefitted or did not benefit from this teaching method.

The study participants will take a critical thinking exam before the first class begins. The participants of the entire class will be given an overview of what critical thinking standards are and how the standards of critical reasoning they be used in the classroom and clinical conferences this semester. A segment of class time will be spent in the sim lab reflecting the lecture topic of the day, and how that relates to patients they may see in the clinical area. The participant will take a post critical thinking exam after the final exam in the class. Each student will have a simulated scenario that will be video-taped. The video will be

1

Date _____
Subject Initials: _____

graded by three nursing professors for appropriate treatment, scored using a rubric with content specific parameters.

The video -taped clinical scenarios will also be evaluated by the same method as non-participants, but their scenario will also be evaluated by a critical thinking rubric. The compiled data will then be analyzed to determine what effect if any this teaching strategy had on the outcomes.

WHAT ARE THE RISKS OF THE STUDY?

There are no risks involved with the study. All students in the Adult Health III class will receive the same instruction and perform the same tasks with the exception of the critical thinking exams that participants will take at the beginning and the end of the semester and the qualitative survey they will complete at the end of the semester. If the student feels that they require counseling due to the burden of the exams or surveys, the university student counseling center will be available and willing to assist them. There are no foreseeable risks to participation.

WHAT ARE THE BENEFITS OF THIS STUDY?

The benefit that may or may not occur is an improvement of clinical judgment which will aid the student in the transition of student to registered nurse. There is no financial compensation to taking part in the study.

ALTERNATIVES TO PARTICIPATING IN THIS STUDY

There is no alternative to participating in this study.

WILL IT COST ME ANYTHING TO BE IN THIS STUDY?

There is no additional cost for participating in the study.

WILL I BE PAID FOR PARTICIPATING?

You will not be paid for being a part of this research study.

WHO IS FUNDING THE STUDY?

There is no funding organization for this research study. The primary researcher will pay for all costs involved in the study.

The University of North Dakota and the research team are receiving no payments from other agencies, organizations, or companies to conduct this research study.

OR

CONFIDENTIALITY

The records of this study will be kept private to the extent permitted by law. In any report about this study that might be published, students will not be identified. Your study record may be reviewed by Government agencies, and the University of North Dakota Institutional Review Board

Any information that is obtained in this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law. Confidentiality will be maintained by coding the names of all participants and locking all

data in a drawer at the university with access available to the primary researcher and the Chair of the department of nursing.

If we write a report or article about this study, we will describe the study results in a summarized manner so that you cannot be identified.

The compilation of the data will be shared with colleagues, my university advisor, and the members of the dissertation committee. The video-taped simulation will be evaluated and also kept in a locked drawer in the department of nursing at the university. The consent forms will be kept in a locked file in the primary researcher's office in an unidentified file.

In the event that this research activity results in an injury, treatment will be available including first aid, emergency treatment and follow-up care as needed. Payment for any such treatment is to be provided by you (you will be billed) or your third-party payer, if any (such as health insurance, Medicare, etc.) No funds have been set aside to compensate you in the event of injury. Also, the study staff cannot be responsible if you knowingly and willingly disregard the directions they give you.

IS THIS STUDY VOLUNTARY?

Your participation is voluntary. You may choose not to participate or you may discontinue your participation at any time without penalty. The student will not receive a lower grade for non-participation.

CONTACTS AND QUESTIONS?

The researcher conducting this study is Rita Meyer. You may ask any questions you have now. If you later have questions, concerns, or complaints about the research please contact Rita Meyer at 701-240-5210, or the advisor at the University of North Dakota overseeing this study; Lars Helgeson, at 701-777-3144

If you have questions regarding your rights as a research subject, or if you have any concerns or complaints about the research, you may contact the University of North Dakota Institutional Review Board at (701) 777-4279. Please call this number if you cannot reach research staff, or you wish to talk with someone else.

Your signature indicates that this research study has been explained to you, that your questions have been answered, and that you agree to take part in this study. You will receive a copy of this form.

Subjects Name: _____

Signature of Subject

Date

(Optional)

I have discussed the above points with the subject or, where appropriate, with the subject's legally authorized representative.

Signature of Person Who Obtained Consent

Date

4

Date: _____
Subject Initials: _____

University of North Dakota
Department of Teaching/Learning
Confidentiality Statement and
Permission for Simulation Videotaping

I, _____, agree to keep the information derived from this scenario confidential. I will not share the scenario details with other students, and I will not discuss the performance of my classmates during the scenario with others. I also give permission to be videotaped during the simulation scenario. I understand that this Videotape will be used for educational purposes only, and that other classmates and Instructors may view this. Following the simulation activity, the videotapes will be kept in a locked drawer accessible only to the primary researcher. I understand that a thorough critical evaluation of my videotaped performance will be conducted and in this way, my learning can be maximized.

(Student Signature)

(Date)

Appendix B

Scenarios With Rubrics

Scenario I

Jeff Harrison is a 23-year-old who presents to the ER brought in by passers-by who witnessed a car drive into a tree at approximately 35 miles an hour, pt not restrained with seatbelt initial loss of consciousness but then started complaining about pain to his leg and his chest, and he was having trouble breathing.

Simulator Programmed:

Vitals: blood pressure: 176/94, HR: 138, Respirations: 32, Heart Monitor: Sinus Tachycardia

4 cm. laceration

ASSESS	PLAN	Interventions	Evaluation
ID / vital signs/GCSx15min	ALT Tissue Perf	Monitor/Backboard/CSP	Pain, neuro status CMS checks
Bleeding, Pain	ALT gas exchange ALT cerebral perfusion	C-collar, Oxygen,	Oxygen sats/SOB
Health history/social		Iv access I8 Ga/LR	patency
Head to toe P S	Report (What)(SBARD)	Control bleeding Clean wound	Blood pressure/ Urine output
Allergies/meds	Order C-spine, CT of head, CXR, Xray femur ABGs,CBC,tox sc		Heart rhythm
Heart rhythm/o2 sats	T&C		

Patient II

John Smith is a 44 year old male patient who was playing volleyball this afternoon and started experiencing a sudden onset of mid-sternal chest pain who became very short of breath and who experienced some mild nausea. His friends brought him to the emergency room:

Program Simulated

Vital Signs: Blood pressure-160/70

Pulse:110

Respiratory Rate-24

Temperature: 99.2

Rhythm: Normal Sinus Rhythm with frequent Premature Ventricular contractions

Scenario II

ASSESS	PLAN	Interventions	Evaluation
ID/Vital signs	Pain	Monitor	Pain
Pain (QRST)	Anxiety	oxygen	Oxygen sats/SOB
Health history/social	Tissue perfusion	IV access	patency
Head to toe	Report (What)(SBARD)	Nitro/SL	Blood pressure/pain
Allergies/meds	Order ekg, troponin	ASA	Heart rhythm
Heart rhythm	Cx-MB		

Scenario III

Geneviève Howard is 70 year old African American female with a history of insulin diabetes, Hypertension, Atherosclerosis, Peripheral vascular disease, congestive heart failure presents with chest pain and SOB. Weight 87.8 kg

Simulator: B.P. 160/98, heart rate 64, Respiratory rate 24, heart rhythm Atrial Fibrillation, Oxygen sats 78%, crackles bilaterally mid-lower lobes

ASSESS	PLAN	Interventions	Evaluation
ID/Vital signs/ blood sugar	Alteration in gas exchange	Monitor, HOB	Pain
Pain (QRST)	Anxiety, chest pain	oxygen	Oxygen sats/SOB
Health history/social	Alteration Tissue perfusion	IV access	patency
Head to toe	Report (What)(SBARD)	(anticipate MS, lasix, foley)	Blood pressure/pain
Allergies/meds	Order EKG, CXR, CBC, BNP, ABG's, chem panel		Heart rhythm
Heart rhythm			

Scenario IV

Myron Bryant 76 year old male pt. with a history of COPD,(home oxygen), chronic cough x3 years, 80pk/smoking history, Atrial Fib new onset, who presents with increasing shortness of breath, malaise, elevated temperature with chills and fatigue. Retired from coal mining. Takes albuterol at home, NKA

Simulator: BP: 158/98, HR 108, O2 sats 80% temp is 100.2, wt. 72 Kg

Heart rhythm: Atrial fib, Lung sounds: Bilateral wheezes, productive cough

ASSESS	PLAN	Interventions	Evaluation
ID / vital signs	ALTERATION IN GAS/EX	Monitor HOB	Respiratory rate/effort
	Anxiety	oxygen@2L	Oxygen sats/SOB
Health history/social	Tissue perfusion	Iv access	patency
Head to toe	Report (What)(SBARD)	Call RT for HHN	Blood pressure
Allergies/meds	Order HHN Albuterol, CXR, ekg ,sputum C&S, Blood culture, CBC		Heart rhythm
Heart rhythm			

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